IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant(s):	Wang, et al.
Appl. No.:	10/506,418
Conf. No.:	8357
Filed:	March 30, 2005
Title:	BIODEGRADABLE MATERIALS FROM STARCH-GRAFTED POLYMERS
Art Unit:	1796
Examiner:	O. Asinovsky
Docket No.:	117682-11

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NON-COMPLIANT APPEAL BRIEF

Sir:

This Response is submitted in reply to the Notice of Non-Compliant Appeal Brief dated October 9, 2008.

REMARKS

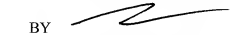
In response to the Notice of Non-Compliant Appeal Brief dated October 9, 2008, Appellants have listed the rejected and withdrawn claims in the claims appendix to address the informality cited by the Patent Office. The compliant version of the Appeal Brief is attached as Exhibit A without copies of the cited references, which were previously submitted.

Appellants submit that the present Appeal Brief is compliant under 37 CFR 41.37. Appellants respectfully request reconsideration of the Appeal Brief and submit that the Patent Office has failed to establish a *prima facie* case of obviousness with respect to the claimed invention. Accordingly, Appellants respectfully submit that the obviousness rejections are erroneous in law and in fact and should therefore be reversed.

The Director is authorized to charge any fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 117682-11 on the account statement.

Respectfully submitted,

BELL, BOYD & LLOYD LLC

BY 

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Dated: October 20, 2008

THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellant(s):	Wang, et al.
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APPELLANTS' APPEAL BRIEF

Sir:

Appellants submit this Appeal Brief in support of the Notice of Appeal filed on June 2, 2008. This Appeal is taken from the Final Rejection in the Office Action dated March 18, 2008.

I. REAL PARTY IN INTEREST

The real party in interest for the above-identified patent application on Appeal is Cereplast, Inc. by virtue of an Assignment recorded on January 13, 2008 at reel 020436, frames 0968-0978 in the United States Patent and Trademark Office.

II. RELATED APPEALS AND INTERFERENCES

Appellant's legal representative and the Assignees of this patent application do not know of any prior or pending appeals, interferences or judicial proceedings that may be related to, directly affect or be directly affected by or have a bearing on the Board's decision with respect to the above-identified Appeal.

III. STATUS OF CLAIMS

Claims 1 and 3-18 are pending in this application. Claim 2 was previously canceled. Claim 19 was previously withdrawn. Claims 1 and 3-18 stand rejected. Therefore, Claims 1 and 3-18 are being appealed in this Brief. A copy of the appealed claims is included in the Claims Appendix.

IV. STATUS OF AMENDMENTS

A final Office Action was mailed on March 18, 2008. In the final Office Action, the Patent Office rejected Claims 1 and 3-18 as obvious in view of several references. Appellants filed a response to the final Office Action on May 14, 2008 with no amendments to the claims. An Advisory Action was mailed on May 21, 2008 maintaining the previous obviousness rejections. Appellants filed a Notice of Appeal on June 2, 2008 with respect to the obviousness rejections. A copy of the final Office Action and Advisory Action are attached as Exhibits A and B, respectively, in the Evidence Appendix.

V. SUMMARY OF CLAIMED SUBJECT MATTER

A summary of the claimed subject matter by way of reference to the specification and/or figures for each of the independent claims is provided as follows:

Independent Claim 1 is directed to a synthetic polymer and starch blend comprising 1-30 wt.% a granular and unplasticized starch (page 4, lines 12-13; page 5, lines 1-6 and 19-22; page 11, lines 1-14; page 21, lines 1-4) having a moisture content of less than about 1 (page 14, lines 12-13; page 16, lines 12-13); 1-24 wt.% a compatibilizer comprising a polymer and a grafting compound (page 4, lines 6-12; page 5, lines 7-18; page 8, lines 5-12; page 13, lines 3-17; page 21, lines 1-4), wherein the grafting compound is covalently bound to the polymer (page 9, lines 4-5; page 21, lines 13-14), and the remainder a second polymer (page 21, lines 1-4).

Independent Claim 10 is directed to a method for synthesizing a synthetic polymer and starch blend comprising mixing 1-30 wt.% granular and unplasticized starch (page 5, lines 1-6 and 19-22; page 11, lines 1-14; page 22, lines 8-10) having a moisture content of less than about 1% (page 14, lines 12-13; page 16, lines 12-13) with 1-24 wt.% compatibilizer comprising a polymer and a grafting compound (page 5, lines 7-18; page 8, lines 5-12; page 10, lines 1-6; page 13, lines 3-17), wherein the grafting compound is covalently bound to the polymer (page 9, lines 4-5; page 21, lines 13-14), and the remainder a second polymer (page 22, lines 8-10); and reacting the mixture such that the compatibilizer and the granular starch become covalently bound (page 4, lines 18-23; page 8, lines 5-12).

Independent Claim 17 is directed to a synthetic polyethylene and starch covalently bound mixture comprising 5-30 wt.% of a granular and unplasticized starch (page 5, lines 1-6 and 19-22; page 11, lines 1-14) selected from the group consisting of wheat starch, cornstarch, rice starch, potato starch or high amylose starch (page 10, lines 1-6), wherein the starch is not gelatinized and has a moisture content of less than about 1% (page 14, lines 12-13; page 16, lines 12-13; page 23, lines 16-17); a first polymer selected from the group consisting of polyethylene, polypropylene or polyethylene derivatives (page 8, lines 15-17; page 10, lines 11-17); a compatibilizer comprising a polymer and a grafting compound (page 5, lines 7-18; page 8, lines 5-12), the grafting compound being selected from the group consisting of maleic anhydride or chemicals having similar reactive properties (page 9, lines 2-10; page 11, lines 23-24; page 13, lines 3-17), and the polymer being covalently bound to the grafting compound (page 9, lines 4-

5; page 21, lines 13-14); wherein application of heat and pressure to the mixture produces covalent bonds between the compatibilizer and the starch (page 4, lines 18-23); wherein the compatibilizer is covalently bound to the first polymer (page 9, lines 4-5; page 21, lines 13-14); wherein the starch granules are 10-100 micrometers in diameter (page 24 line 1); wherein the compatibilizer is attached to approximately 5% of individual monomer units (page 5, lines 19-20); wherein the resulting mixture has similar mechanical properties to pure polyethylene (page 4, lines 1-2); and wherein the mixture absorbs relatively little water (page 5, lines 1-5).

Although specification citations are given in accordance with 37 C.F.R. §1.192(c), these reference numerals and citations are merely examples of support in the specification for the terms used in this section of the Brief. There is no intention to suggest in any way that the terms of the claims are limited to the examples in the specification. As demonstrated by the references numerals and citations, the claims are fully supported by the specification as required by law. However, it is improper under the law to read limitations from the specification into the claims. Pointing out specification support for the claim terminology in accordance with Rule 1.192(c) does not in any way limit the scope of the claims to those examples from which they find support. Nor does this exercise provide a mechanism for circumventing the law precluding reading limitations into the claims from the specification. In short, the references numerals and specification citations are not to be construed as claim limitations or in any way used to limit the scope of the claims.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 1 and 3-18 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,115,000 to Jane et al. ("*Jane*") in view of U.S. Patent No. 5,510,401 to Dehennau et al. ("*Dehennau*") and in further view of U.S. Patent No. 6,242,503 to Kozma et al. ("*Kozma*"). Copies of *Jane*, *Dehennau* and *Kozma* are attached hereto as Exhibits C, D and E, respectively, in the Evidence Appendix.

2. Claims 1 and 3-17 are rejected under 35 U.S.C. §103(a) as being unpatentable over *Dehennau* in view of U.S. Patent No. 6,231,970 to Andersen et al. ("*Andersen*") and in view of *Kozma* and further in view of U.S. Patent No. 5,496,895 to Chinnaswamy et al. ("*Chinnaswamy*"). Copies of *Andersen* and *Chinnaswamy* are attached hereto as Exhibits F and G, respectively, in the Evidence Appendix.

3. Claim 18 is rejected under 35 U.S.C. §103(a) as being unpatentable over *Dehennau* in view of *Andersen* and in view of *Kozma* and further in view of *Chinnaswamy* and U.S. Patent No. 5,216,075 to Papazoglou et al. ("*Papazoglou*"). A copy of *Papazoglou* is attached hereto as Exhibit H in the Evidence Appendix.

VII. ARGUMENT

A. LEGAL STANDARDS

Obviousness under 35 U.S.C. §103

The Federal Circuit has held that the legal basis for a determination of obviousness under 35 U.S.C. § 103 is:

> whether the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made...The foundational facts for the prima facie case of obviousness are: (1) the scope and content of the prior art; (2) the difference between the prior art and the claimed invention; and (3) the level of ordinary skill in the art...Moreover, objective indicia such as commercial success and long felt need are relevant to the determination of obviousness...Thus, each obviousness determination rests on its own facts.

In re Mayne, 41 U.S.P.Q. 2d 1451, 1453 (Fed. Cir. 1997).

In making this determination, the Patent Office has the initial burden of proving a *prima facie* case of obviousness. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q. 2d 1955, 1956 (Fed. Cir. 1993). This burden may only be overcome "by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings." *In re Fine*, 837 F.2d 1071, 1074, 5 U.S.P.Q. 2d 1596, 1598 (Fed. Cir. 1988). "If the examination at the initial stage does not produce a prima facie case of unpatentability, then without more the applicant is entitled to grant of the patent." *In re Oetiker*, 24 U.S.P.Q. 2d 1443, 1444 (Fed. Cir. 1992).

Moreover, the Patent Office must provide explicit reasons why the claimed invention is obvious in view of the prior art. The Supreme Court has emphasized that when formulating a rejection under 35 U.S.C. § 103(a) based upon a combination of prior art elements it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed. *KSR v. Teleflex*, 127 S. Ct. 1727 (2007).

Of course, references must be considered as a whole and those portions teaching against or away from the claimed invention must be considered. *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve Inc.*, 796 F.2d 443 (Fed. Cir. 1986). "A prior art reference may be considered

to teach away when a person of ordinary skill, upon reading the reference would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the Applicant." *Monarch Knitting Mach. Corp. v. Fukuhara Indus. Trading Co., Ltd.*, 139 F.3d 1009 (Fed. Cir. 1998) (quoting *In re Gurley*, 27 F.3d 551 (Fed. Cir. 1994)).

B. THE CLAIMED INVENTION

There are three independent claims on appeal: Claims 1, 10 and 17. Independent Claim 1 is generally directed to a synthetic polymer and starch blend comprising a) 1-30 wt.% of a granular and unplasticized starch having a moisture content of less than about 1 and b) 1-24 wt.% of a compatibilizer comprising a polymer and a grafting compound. The grafting compound is covalently bound to the polymer. The remainder of the blend is a second polymer.

Independent Claim 10 is generally directed to a method for synthesizing a synthetic polymer and starch blend comprising mixing a) 1-30 wt.% of a granular and unplasticized starch having a moisture content of less than about 1% with b) 1-24 wt.% of a compatibilizer comprising a polymer and a grafting compound. The grafting compound is covalently bound to the polymer, and the remainder is a second polymer. The method further comprises reacting the mixture such that the compatibilizer and the granular starch become covalently bound.

Independent Claim 17 is generally directed to a synthetic polyethylene and starch covalently bound mixture comprising a) 5-30 wt.% of a granular and unplasticized starch selected from the group consisting of wheat starch, cornstarch, rice starch, potato starch or high amylose starch. The starch is not gelatinized and has a moisture content of less than about 1%. The mixture further comprises b) a first polymer selected from the group consisting of polyethylene, polypropylene or polyethylene derivatives and c) a compatibilizer comprising a polymer and a grafting compound. The grafting compound is selected from the group consisting of maleic anhydride or chemicals having similar reactive properties, and the polymer is covalently bound to the grafting compound. Application of heat and pressure to the mixture produces covalent bonds between the compatibilizer and the starch. The compatibilizer is covalently bound to the first polymer. The starch granules are 10-100 micrometers in diameter.

The compatibilizer is attached to approximately 5% of individual monomer units. The resulting mixture has similar mechanical properties to pure polyethylene, and the mixture absorbs relatively little water.

C. THE REJECTION OF CLAIMS 1 AND 3-18 UNDER 35 U.S.C. §103(A) TO *JANE*, *DEHENNAU* AND *KOZMA* SHOULD BE REVERSED BECAUSE THE EXAMINER HAS FAILED TO ESTABLISH A *PRIMA FACIE* CASE OF OBVIOUSNESS WITH RESPECT TO CLAIMS 1 AND 3-18

Independent Claims 1, 10 and 17 recite, in part, a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch having a moisture content of less than about 1%. As discussed in more detail below, the advantages of the claimed invention rely, in part, on using a starch that is unplasticized and has a moisture content of less than about 1%. In contrast, Appellants respectfully submit that, even if combined, the cited references fail to disclose or suggest every element of independent Claims 1, 10 and 17.

Conventional mixtures of starch and polymers have resulted in materials with poor physical qualities. Starch generally does not mix well with typical polymers such as polyethylene, polypropylene, etc. In an attempt to improve these mixtures, some researchers have used high amylose starch. Although high amylose starch slightly improves the physical properties of the mixtures, it is relatively expensive and reduces or eliminates the cost benefits of these mixtures. Gelatinized starch has also been used in an attempt to improve these mixtures. However, gelatinized starch as well as high amylose starch requires the addition of a plasticizer.

In existing starch/polymer blends, a plasticizer is utilized to facilitate blending of the starch and polymer. The addition of a plasticizer poses several disadvantages. First, it requires processing of the starch, which increases the cost. In addition, plasticizers such as glycerol increase the water absorbency of the polymer and starch mixture. This has a deleterious effect on the mixture's physical properties, making them impractical to use.

An advantage of the claimed synthetic polymer and starch blend is that the starch is unplasticized (e.g. lacks a plasticizer) and has a moisture content of less than about 1%. By eliminating the need for a plasticizer, for example, by replacing it with a compatibilizer in accordance with the claimed blend, the water absorbency of the final polymer and starch blend

can be reduced. Moreover, the low moisture content of the starch ensures that very little moisture is in the polymer and starch blend to begin with. The absence of the plasticizer and the low moisture content of the starch provides for a stronger, more durable product made from the polymer/starch blend. See specification, Examples 1 and 2.

Jane fails to disclose or suggest a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch having a moisture content of less than about 1% as required by independent Claims 1, 10 and 17. *Jane* is directed to starch plastics that incorporate modified polyethylene. At no point does *Jane* teach using a starch that has a moisture content of less than about 1% or drying a starch to give a moisture content of less than about 1%. The Examiner admits same. See Office Action dated March 18, 2008, page 4.

The Examiner alleges that *Jane* must "inherently" disclose a starch having a moisture content of less than about 1% because *Jane* teaches heating the components of his starch-based product at 110 °C to 200 °C while blending. Appellants respectfully disagree with the Examiner's inherency argument that *Jane* inherently discloses a starch having a moisture content of less than about 1% based solely on the blended components being heated.

As shown in Chapter 4 of the publication Technology of Corn Wet Milling and Associated Process by Paul Harwood Blanchard, 2002 (attached as Exhibit I), starch typically has a moisture content of 12%. See *id.* at 141-142. It takes a great deal of time and energy to reduce the moisture content of starch to less than about 1%. For example, as described in Examples 1-2, Appellants dried cornstarch at 120 °C for 24 hours to reach a moisture content of less than 1% prior to the sample preparation. Moreover, the cornstarch was dried at 120 °C for 24 hours prior to blending the cornstarch with any other components, which would have reduced the drying efficiency of the starch.

Jane teaches heating the starch of his starch-based product at 110 °C to 200 °C as it is blended with the oxidized polyethylene and unmodified polyethylene. *Jane* does not teach using the high temperature blending to remove moisture from the starch or even suggest the need for reducing the moisture content of the starch to below 1% as a starting material as a way to improve the quality of his product. Even at processing temperatures of at 110 °C to 200 °C, blending the starch with other components is likely to prevent substantial moisture from being removed from the starch unless the blending was done for an extremely long time. However, *Jane* does require any specific time or duration for blending the starch-based product at this

temperature. In fact, *Jane* teaches that the time for heating and blending to occur is not critical to the process. See *Jane*, column 4, lines 22-23. As a result, *Jane* is not interested in reducing the moisture content of the starch to less than about 1% or utilizing this reduced moisture starch in accordance with the present claims.

Moreover, *Jane* even teaches a very short mixing time. In one example, *Jane* teaches that for a screw extruder, one calculates the mixing time by determining the length of the barrel and dividing this by the number of flights to obtain the pitch. See *Jane*, column 4, lines 25-35. The revolutions per minute are multiplied by the pitch to obtain the screw speed. The length of the barrel is divided by the screw speed to obtain the mixing time. In the example, the barrel length was 31.24 inches, and there were 25 flights yielding a pitch of 1.25 inches. At 15 rpm, the screw speed is 18.75 inches per minute. The mixing time is then calculated at 1.67 minutes. At a mixing time of 1.67 minutes for the blend, it is highly unlikely that the starch (initial moisture content of ~12%) will have its moisture reduced below 1% even in the absence of being blended with other components.

To satisfy the test for inherency, heating the components of *Jane's* starch-based product at 110 °C to 200 °C to evaporate water from the product would necessarily (i.e. always or automatically) reduce the moisture content of the starch to less than about 1%. That condition simply is not met under the present circumstances as previously discussed. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. See, MPEP 2112. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art). Consequently, the Examiner has failed to provide a basis in fact or technical reasoning to support the determination that the allegedly inherent characteristic of a starch having a moisture content of less than about 1% necessarily flows from the teachings of *Jane*.

Dehennau fails to remedy the deficiencies of *Jane*. For example, *Dehennau* fails to disclose or suggest a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch as required by independent Claims 1, 10 and 17. *Dehennau* is directed to an alloy composition that possesses improved properties of transparency and mechanical resistance. The alloy composition comprises a starch and a polymer acting as coupling agent comprising polyolefins modified by chemical functional groups that are active towards the

hydroxyl functional groups of starch. *Dehennau* specifically teaches that the use of starch supplemented with a plasticizer, in particular glycerine, diglycerine, polyglycerine and/or sorbitol, can prove to be advantageous in many cases. See *Dehennau*, column 3, lines 11-13. As a result, *Dehennau* not only fails to disclose or suggest a 1-30 wt.% of an unplasticized starch, *Dehennau* teaches away from same.

Dehennau also fails to disclose or suggest an unplasticized starch having a moisture content below 1%. Instead, *Dehennau* teaches using a starch that retains its initial moisture (~12%) or has water added to it, which teaches away from the present claims. *Dehennau* discloses in Examples 13 and 14 that a normal, native and non-dried maize starch (12.5% by weight of water) is mixed with glycerine and another polymer and processed together to produce his film. *Dehennau* further teaches that starches used are of natural and plant origin and may be structurally modified, pregelatinised or modified after the addition of water and/or a plasticizer. See *Dehennau*, column 3, lines 17-23.

Kozma fails to remedy the deficiencies of *Dehennau*. For example, *Kozma* fails to disclose or suggest a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch as required by independent Claims 1, 10 and 17. *Kozma* also fails to disclose or suggest an unplasticized starch having a moisture content of less than about 1% as required by independent Claims 1, 10 and 17. In fact, *Kozma* fails to even disclose or suggest the use of any starch in his polymer articles.

For at least the reasons identified above, even if combined, *Jane*, *Dehennau* and *Kozma* fail to disclose or even suggest every element of independent Claims 1, 10 and 17, as well as Claims 3-9, 11-16 and 18 that depend from Claims 1, 10 and 17. Moreover, the cited references fail to even recognize the advantages, benefits and/or properties of a synthetic polymer and starch blend made in accordance with Claims 1, 10 and 17. Accordingly, Appellants respectfully submit that Claims 1 and 3-18 are novel, nonobvious and distinguishable from the cited references and are in condition for allowance.

D. THE REJECTION OF CLAIMS 1 AND 3-17 UNDER 35 U.S.C. §103(A) TO *DEHENNAU*, *ANDERSEN*, *KOZMA* AND *CHINNASWAMY* SHOULD BE REVERSED BECAUSE THE EXAMINER HAS FAILED TO ESTABLISH A *PRIMA FACIE* CASE OF OBVIOUSNESS WITH RESPECT TO CLAIMS 1 AND 3-17

Independent Claims 1, 10 and 17 recite, in part, a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch having a moisture content of less than about 1%. As previously discussed, an advantage of the claimed synthetic polymer and starch blend is that the starch is unplasticized (e.g. lacks a plasticizer) and has a moisture content of less than about 1%. In contrast, Appellants respectfully submit that, even if combined, *Dehennau*, *Andersen*, *Kozma* and *Chinnaswamy* fail to disclose or suggest every element of independent Claims 1, 10 and 17.

Dehennau fails to disclose or suggest a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch as required by independent Claims 1, 10 and 17 and actually teaches away from same. *Dehennau* is directed to an alloy composition comprising a starch and a polymer acting as coupling agent comprising polyolefins modified by chemical functional groups. *Dehennau* specifically teaches the advantages of using starch supplemented with a plasticizer, in particular glycerine, diglycerine, polyglycerine and/or sorbitol, to produce the alloy composition. See *Dehennau*, column 3, lines 11-13. As a result, *Dehennau* fails to disclose and teaches away from a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch in accordance with the present claims.

Dehennau also fails to disclose or suggest an unplasticized starch having a moisture content below 1% and teaches away from same. For example, *Dehennau* teaches using a starch that retains its initial moisture (~12%) or has water added to it. *Dehennau* discloses in Examples 13 and 14 that a normal, native and non-dried maize starch (12.5% by weight of water) is mixed with glycerine and another polymer and processed together to produce his film. *Dehennau* further teaches that starches used are of natural and plant origin and may be structurally modified, pregelatinised or modified after the addition of water and/or a plasticizer. See *Dehennau*, column 3, lines 17-23.

Kozma fails to remedy the deficiencies of *Dehennau*. *Kozma* fails to disclose or suggest a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch as required by independent Claims 1, 10 and 17. *Kozma* also fails to disclose or suggest an

unplasticized starch having a moisture content of less than about 1% as required by independent Claims 1, 10 and 17. In fact, *Kozma* fails to even disclose or suggest the use of any starch in his polymer articles.

Andersen fails to remedy the deficiencies of *Dehennau*. *Andersen* fails to disclose or suggest a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch as required by independent Claims 1, 10 and 17. *Andersen* is directed to thermoplastic starch compositions having a particulate filler. *Andersen* specifically teaches that the starch compositions include two or more chemically or physically distinct materials or phases such as the binding matrix comprising, at a minimum, a starch melt formed by plasticizing starch with a plasticizer, a particulate filler and optional admixtures. See *Andersen*, column 11, lines 35-40. *Andersen* further teaches that these materials impart one or more unique properties to the final thermoplastic starch compositions made therefrom, as well as to the sheets, films and other articles manufactured therefrom. See *Andersen*, column 11, lines 43-46. As a result, *Andersen* requires the use of plasticized starch to form the starch melt, which not only fails to disclose the present claims but actually teaches away from same.

Chinnaswamy fails to remedy the deficiencies of *Dehennau*. *Chinnaswamy* fails to disclose or suggest a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch as required by independent Claims 1, 10 and 17. *Chinnaswamy* also fails to disclose or suggest an unplasticized starch having a moisture content of less than about 1% as required by independent Claims 1, 10 and 17. *Chinnaswamy* is direct to biodegradable plastic made by mixing starches and a non-biodegradable polymer such as a polystyrene, polyurethane, polyethylene, polypropylene, or polycarbonate and, in the presence of an added oxidizing agent, treating the mixture under heat, pressure and reagents to break the polymers. Nevertheless, *Chinnaswamy* fails to disclose or suggest using any unplasticized starch that has a moisture content of less than about 1% or even drying an unplasticized starch to give a moisture content of less than about 1%.

For at least the reasons identified above, even if combined, *Dehennau*, *Andersen*, *Kozma* and *Chinnaswamy* fail to disclose or even suggest every element of independent Claims 1, 10 and 17, as well as Claims 3-9, 11-16 and 18 that depend from Claims 1, 10 and 17. Moreover, the cited references fail to even recognize the advantages, benefits and/or properties of a synthetic polymer and starch blend made in accordance with Claims 1, 10 and 17. Accordingly,

Appellants respectfully submit that Claims 1 and 3-18 are novel, nonobvious and distinguishable from the cited references and are in condition for allowance.

E. THE REJECTION OF CLAIM 18 UNDER 35 U.S.C. §103(A) TO *DEHENNAU, ANDERSEN, KOZMA, CHINNASWAMY* AND *PAPAZOGLOU* IS IMPROPER IN VIEW OF THE PATENTABILITY OF INDEPENDENT CLAIM 1

Claim 18 stands rejected under 35 U.S.C. §103(a) as being unpatentable over *Dehennau, Andersen, Kozma, Chinnaswamy* and *Papazoglou*. Appellants respectfully submit that the patentability of Claim 1 over *Dehennau, Andersen, Kozma* and *Chinnaswamy* as discussed above also demonstrates that the obviousness rejection of Claim 18, which depends from Claim 1, is improper. In this regard, even with *Papazoglou* as a reference, the cited art fails to teach or suggest the elements of Claim 18 in combination with the novel elements of Claim 1.

For example, even if combined, *Dehennau, Andersen, Kozma*, and *Chinnaswamy* fail to disclose or suggest a synthetic polymer and starch blend comprising 1-30 wt.% of an unplasticized starch or an unplasticized starch having a moisture content of less than about 1% as required by independent Claims 1, 10 and 17. *Papazoglou* fails to remedy the deficiencies of *Dehennau, Andersen, Kozma*, and *Chinnaswamy*. *Papazoglou* is directed to moldable multi-phase polyblends comprising blends of a polyamide, a thermoplastic copolymer of an α,β-unsaturated carboxylic acid and a monovinyl aromatic monomer, and an anhydride-functionalized elastomer. *Papazoglou* fails to even disclose or suggest the use of any starch, whether plasticized or not, in his polymer articles.

Accordingly, Appellants respectfully submit that Claim 18 that depends from Claim 1 is novel, nonobvious and distinguishable from the cited references and is in condition for allowance.

VIII. CONCLUSION

Appellants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness under 35 U.S.C. §103 with respect to the rejections of Claims 1 and 3-18. Accordingly, Appellants respectfully submit that the obviousness rejections are erroneous in law and in fact and should therefore be reversed by this Board.

A check in the amount of $510 is submitted herewith to cover the cost of the Appeal Brief. The Director is authorized to charge any additional fees that may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 117682-11 on the account statement.

Respectfully submitted,

BELL, BOYD & LLOYD LLC

BY _____

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Dated: October 20, 2008

CLAIMS APPENDIX

PENDING CLAIMS ON APPEAL OF U.S. PATENT APPLICATION SERIAL NO. 10/506,418

1 (rejected): A synthetic polymer and starch blend comprising:

1-30 wt.% a granular and unplasticized starch having a moisture content of less than about 1%;

1-24 wt.% a compatibilizer comprising a polymer and a grafting compound, wherein said grafting compound is covalently bound to said polymer, and

the remainder a second polymer.

2 (canceled):

3 (rejected): The blend of Claim 1 wherein said starch is selected from the group consisting of cornstarch, wheat starch, rice starch, and potato starch.

4 (rejected): The blend of Claim 1 wherein said compatibilizer is comprised of 75-98 wt.% polymer and 2-25 wt.% grafting compound.

5 (rejected): The blend of Claim 4 wherein said grafting compound is maleic anhydride.

6 (rejected): The blend of Claim 4 wherein the polymer of the compatibilizer is selected from the group consisting of polyethylene, polypropylene, polystyrene, polybutylene, poly(styrene-ethylene-butylene-styrene), poly(ethylene terephthalate), polyvinyl fluoride, polyvinyl chloride, or derivatives thereof.

7 (rejected): The blend of claim 4 wherein said grafting compound comprises 5 wt.% of said compatibilizer.

8 (rejected): The blend of claim 1 wherein said second polymer is selected from the group consisting of polyethylene, polypropylene, polystyrene, polybutylene, poly(styrene-ethylene-butylene-styrene), poly(ethylene terephthalate), polyvinyl fluoride, polyvinyl chloride, or derivatives thereof.

9 (rejected): The blend of Claim 1 wherein said second polymer is polyethylene.

10 (rejected): A method for synthesizing a synthetic polymer and starch blend, comprising:

mixing 1-30 wt.% granular and unplasticized starch having a moisture content of less than about 1% with 1-24 wt.% compatibilizer comprising a polymer and a grafting compound, wherein said grafting compound is covalently bound to said polymer, and the remainder a second polymer; and

reacting the mixture such that the compatibilizer and the granular starch become covalently bound.

11 (rejected): The method of Claim 10 wherein said reacting comprises applying heat and pressure.

12 (rejected): The method of Claim 10 wherein said compatibilizer comprises 1-20 wt.% grafting compound and 80-99 wt.% polymer.

13 (rejected): The method of Claim 12 wherein said grafting compound is maleic anhydride.

14 (rejected): The method of Claim 12 wherein said grafting compound comprises 5 wt.% of said compatibilizer.

15 (rejected): The method of Claim 12 wherein the polymer of the compatibilizer is selected from the group consisting of polyethylene, polypropylene, polystyrene, polybutylene, poly(styrene-ethylene-butylene-styrene), poly(ethylene terephthalate), polyvinyl fluoride, polyvinylchloride, or derivatives thereof.

16 (rejected): The method of Claim 10 wherein said second polymer is selected from the group consisting of polyethylene, polypropylene, polystyrene, polybutylene, poly(styrene-ethylene-butylene-styrene), poly(ethylene terephthalate), polyvinyl fluorides, polyvinyl chloride, or derivatives thereof.

17 (rejected): A synthetic polyethylene and starch covalently bound mixture comprising:

5-30 wt.% of a granular and unplasticized starch selected from the group consisting of wheat starch, cornstarch, rice starch, potato starch or high amylose starch, wherein said starch is not gelatinized and has a moisture content of less than about 1%;

a first polymer selected from the group consisting of polyethylene, polypropylene or polyethylene derivatives;

a compatibilizer comprising a polymer and a grafting compound, the grafting compound being selected from the group consisting of maleic anhydride or chemicals having similar reactive properties, and the polymer being covalently bound to the grafting compound;

wherein application of heat and pressure to the mixture produces covalent bonds between the compatibilizer and the starch;

wherein said compatibilizer is covalently bound to said first polymer;

wherein said starch granules are 10-100 micrometers in diameter;

wherein said compatibilizer is attached to approximately 5% of individual monomer units;

wherein the resulting mixture has similar mechanical properties to pure polyethylene; and

wherein said mixture absorbs relatively little water.

18 (rejected): The synthetic polymer and starch blend of Claim 1 wherein the second polymer is selected from the group consisting of polyethylene, polypropylene, polystyrene, polybutylene, poly(styrene-ethylene-butylene-styrene), poly(ethylene terephthalate), polyvinyl fluoride, polyvinyl chloride or derivatives thereof and the compatibilizer is comprised of maleic anhydride grafted poly(styrene-ethylene-butylene-styrene).

19 (withdrawn): The blend of Claim 1 wherein said grafting compound is selected from the group consisting of epoxides.

EVIDENCE APPENDIX

EXHIBIT A: Final Office Action dated March 18, 2008

EXHIBIT B: Advisory Action dated May 21, 2008

EXHIBIT C: U.S. Patent No. 5,115,000 to Jane et al. ("*Jane*"), cited by the Examiner in the Office Action dated March 18, 2008

EXHIBIT D: U.S. Patent No. 5,510,401 to Dehennau et al. ("*Dehennau*"), cited by the Examiner in the Office Action dated March 18, 2008

EXHIBIT E: U.S. Patent No. 6,242,503 to Kozma et al. ("*Kozma*"), cited by the Examiner in the Office Action dated March 18, 2008

EXHIBIT F: U.S. Patent No. 6,231,970 to Andersen et al. ("*Andersen*"), cited by the Examiner in the Office Action dated March 18, 2008

EXHIBIT G: U.S. Patent No. 5,496,895 to Chinnaswamy et al. ("*Chinnaswamy*"), cited by the Examiner in the Office Action dated March 18, 2008

EXHIBIT H: U.S. Patent No. 5,216,075 to Papazoglou et al. ("*Papazoglou*"), cited by the Examiner in the Office Action dated March 18, 2008

EXHIBIT I: Chapter 4 of the publication Technology of Corn Wet Milling and Associated Process

RELATED PROCEEDINGS APPENDIX

None